

Tensegrity

- Cells use a tensegrity architecture to organize cytoskeleton and stabilize form
- Cells are hard-wired to respond immediately to external mechanical stress
- Cytoskeletal networks interface with cell surface receptor complexes and with the nucleus

Tensegrity

- Signal Transduction
 - In many instances is highly integrated and therefore susceptible to changes in the force environment
 - There are independent signal transductions that are less affected by changes in force
 - Not all perturbations by force result in defective signal transductions

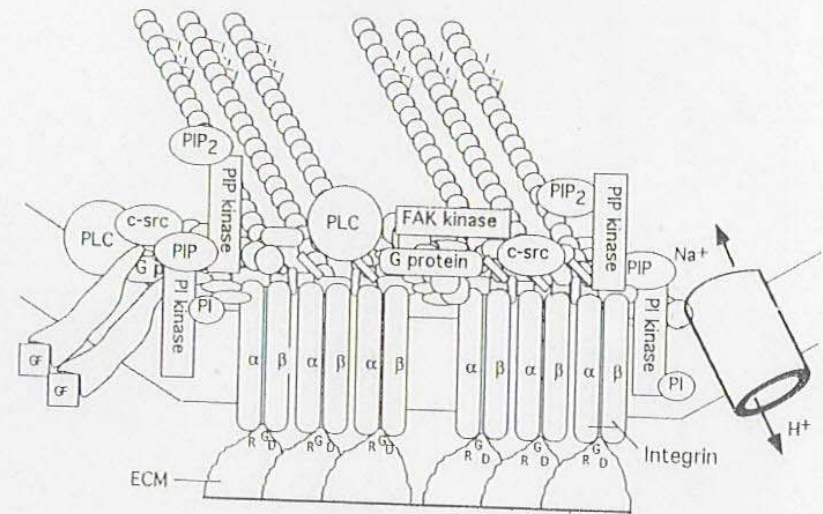
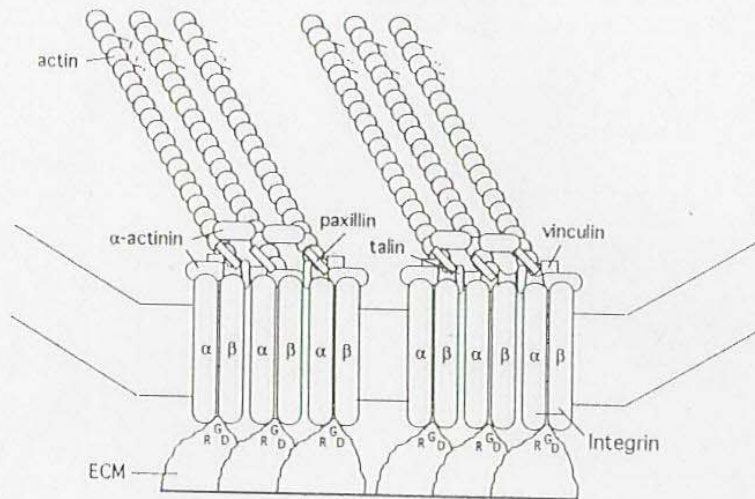
Tensegrity

- Mechanochemical switching
 - Mechanosensitive channels
 - Respond to ligands
 - Shear
 - Torsional
 - Adhesion molecules
 - Anchorage
 - Shape
 - Deformation
 - Loading

Tensegrity

- Focal adhesion complex
 - Interact with the extracellular matrix
 - Forces may changes spatial arrangements in receptor complexes
 - Result in changes in signal efficiency
 - Affinity
 - Assembly
 - Continuity

SIGNAL INTEGRATION IN THE FOCAL ADHESION COMPLEX



Tensegrity

- The network of microtubules, actin, myosin and the proteins involved their anchorage within the cell is organized such that a small focal deformation is frequently translated into changes at distal locations
- When cells are organized in matrix and in tissues the forces may have less immediate influence
- How does this relate to the observations in microgravity with cells and with humans??